

ABSTRACT

An electrochemical cell for electrochemical reduction of a metal oxide, such as titania, in a solid state, is disclosed. The cell includes (a) a molten electrolyte (18), (b) a cathode (20) formed at least in part from the metal oxide in contact with the electrolyte, 5 (c) an anode (14), and (d) a membrane (16) that separates the electrolyte and the anode. The membrane is permeable to oxygen cations and is impermeable to dissolved metal in the electrolyte. Optionally, the membrane is impermeable to any one or more of (i) electrolyte anions other than oxygen anions, (ii) anode metal cations, and (iii) any other ions and atoms. An electrochemical method based on the above cell is 10 also disclosed.